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PATENT SPECIFICATION

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COMPLETE SPECIFICATION

Improved Process for the Production of Synthetic or Natural Vulcanized Rubber containing Titanium Dioxide

We, SPOLEK PRO CHEMICKOU A HUTNI VYROBU, narodni podnik, of Stepanska 30, Prague II, Czecho-Slovakia, a Czecho-Slovakian Corporation, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

It is known that titanium dioxide has long been used for brightening the colour of rubber mixes owing to its excellent colouring properties.

The commercial titanium dioxide hitherto regularly employed consists solely of anatase according to its crystal structure.

It has now been found that a titanium dioxide which is shown by the crystallogram to have an entirely or mainly rutile structure is particularly suitable for the purposes of the rubber industry. If this modification of titanium dioxide is applied to rubber mixes, not only is the lightness

of the colour of the products increased, but a substantial improvement in their mechanical properties with regard to tensile strength, elongation at rupture, rigidity and the like is also obtained.

It has also been found that such a titanium dioxide, in contrast to anatase, so influences the vulcanization that the proportion of accelerator added can be reduced and a reduction in cost thus obtained.

In addition, vulcanized rubbers produced with rutile are considerably more resistant to ageing than those produced with anatase.

The following working examples are intended to show the advantageous action in rubber mixes, of a titanium dioxide pigment in which about 95% of the titanium dioxide is present in the form of the rutile modification, as compared with a pure commercial anatase product.

EXAMPLE I

100	parts by weight	Crepe rubber	
5	" "	Zinc white	
2.7	" "	Sulphur	Vulcanization :
0.75	" "	Stearic acid	15 minutes at 3 atm.
0.8	" "	Mercaptobenzothiazole	
0.2	" "	Hexamethylene tetramine	
5	" "	Titanium dioxide	

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EXAMPLE 1 Continued

After the Vulcanization :

	TiO ₂ Modification	Tensile Strength	Elongation at Rupture	Rigidity at 500% Elongation
5	Rutile	157	680	88
	Anatase	140	660	78

After 6 months natural ageing :

	TiO ₂ Modification	Tensile Strength	Elongation at Rupture	Rigidity at 500% Elongation
10	Rutile	155	670	87
	Anatase	136	642	80

EXAMPLE 2

100	parts by weight	A mixed polymerisate of butadiene with acrylonitrile		
15	20	" "	"	Tricresyl phosphate
	80	" "	"	Chalk
	75	" "	"	Kaolin
	10	" "	"	Zinc white
	0.375	" "	"	Tetramethylthiuram disulphide
20	0.150	" "	"	Benzothiazyl disulphide
	1.600	" "	"	Resin oil light yellow
	0.500	" "	"	Stearic acid
	2.00	" "	"	Sulphur
	47.00	" "	"	Titanium dioxide

	TiO ₂ — Modification	Tensile Strength	Elongation at Rupture	Rigidity at 500% Elongation
25	Rutile	75	667	65
	Anatase	68	668	50

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EXAMPLE 3

100 parts by weight of 1st quality pal crepe rubber

50 " " " Chalk

2.4 " " " Sulphur

5 1.6 " " " Stearic acid

0.15 " " " Tetramethyl thiuram disulphide

0.25 " " " Benzothiazyl disulphide

5.0 " " " Zinc oxide

20 " " " Titanium dioxide

10 After vulcanization :

TiO ₂ — Modification	Tensile Strength	Elongation at Rupture	Rigidity at 500% Elongation
Rutile	112	697	48
Anatase	102	657	50

15 After 6 months natural ageing :

TiO ₂ Modification	Tensile Strength	Elongation at Rupture	Rigidity at 500% Elongation
Rutile	116	676	58
Anatase	100	634	59

20 These figures clearly show the advantageous behaviour of rutile in rubber mixtures as compared with the anatase product hitherto employed, although the composition of the mixtures was not aimed at this particular behaviour of the rutile.

25 Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is :—

30 1. A process for the production of synthetic or natural vulcanized rubber containing titanium dioxide, characterised in that a titanium dioxide is employed, the structure of which is shown by the crystallogram to be entirely or for the greater

part rutile.

2. A process for the production of synthetic or natural vulcanized rubber substantially as described in any of the foregoing Examples wherein 95% of the titanium dioxide is present in the form of the rutile modification.

3. Synthetic or natural vulcanized rubber whenever prepared or produced by the process claimed in claim 1 or claim 2.

Dated this 24th day of December, 1947.

SPOLEK PRO CHEMICKOU

A HUTNI VYROBU,

narodni podnik,

Per : Boulton, Wade & Tennant,
111/112, Hatton Garden, London, E.C.1,
Chartered Patent Agents.